**NATURAL RESOURCES CONSERVATION SERVICE**
**CONSERVATION PRACTICE STANDARD**

# IRRIGATION WATER CONVEYANCE

# RIGID GATED PIPELINE

**(Ft.)**
**CODE 430-HH**

## DEFINITION

A rigid pipeline, with closely spaced gates, installed as part of a surface irrigation system.

## PURPOSE

To efficiently convey and distribute irrigation water to the land surface for better water management, without causing excessive erosion, water losses, or reduction in water quality.

## CONDITIONS WHERE PRACTICE APPLIES

The rigid gated pipeline shall be planned and located to serve as an integral part of an irrigation system that has been designed to help conserve soil and water resources on a farm. This practice shall not be used in lieu of buried pipelines for conveyance systems; however, reaches of ungated pipe may be used to obtain necessary working pressure for the system or to convey the water between fields (typically less than 300 feet in length), to various points in the field for splitting irrigation runs, for surge irrigation and where rock interferes with the installation of buried pipelines.

Water supplies and rates of irrigation delivery for the area served by the gated pipe shall be sufficient to make irrigation practical for the crop to be grown and for the border, furrow, corrugation, or contour water application methods.

## DESIGN CRITERIA

All planned work shall comply with all Federal, State, and local laws and regulations.

**Working pressure.** The maximum working pressure shall be 10 psi or 23 feet of head. Design working heads in excess of 23 feet shall be controlled by installing orifice plate head reducers, butterfly valves, stand pipes, water control structures or other appurtenances for head control.

**Friction losses.** For design purposes, friction head losses shall be no less than those computed by the Hazen-Williams equation, using a roughness coefficient of C=130 for aluminum pipe and C=150 for plastic pipe. A multiple outlet factor should be used in computing losses only when it affects the design pipe size.

**Flow velocity.** The design velocity in the pipeline when operating at system capacity should not exceed 5 ft/s, but shall not exceed 7 ft/s.

**Capacity.** The design capacity of the pipeline shall be sufficient to deliver an adequate irrigation stream to the design area for the planned irrigation method.

**Outlet gates.** Individual outlet gates shall have the capacity at design working pressure to deliver the required flow to a point at least 0.3 feet above the field surface.

**Head requirement.** The working head shall be not less than 0.5 feet above outlet gates, unless a detailed design is completed to indicate that a lower head requirement is adequate to deliver the required water to the field. Where the design working head exceeds 5 feet, individual "socks" shall be installed on each gate or permanent vegetation shall be planted along the pipeline or some other means of erosion control shall be provided. The use of a multiple outlet factor is not required in checking for the 5 foot head

limitation for working head. The total design flow may be used throughout the pipeline reach.

**Flushing.** A suitable outlet shall be installed at the terminal end of the pipeline for flushing the pipeline of sediment or other foreign material.

**Quality of water.** Water quality shall be evaluated for all aluminum pipeline installations. A copper content in excess of 0.02 ppm produces nodular pitting and rapid deterioration of pipe if water is allowed to become stagnant. The pipeline should be drained after use. Provide a trash rack or screen at or near inlet to prevent trash inflow into the gated pipe.

**Materials.** Gated pipe shall be aluminum or plastic materials. All fittings and couplers shall equal or exceed the pressure rating of the pipe with which they will be used. They shall be made of material that is recommended by the manufacturer for use with the pipe.

Aluminum pipe shall conform to the chemical composition criteria in ASTM B241, Specifications for Aluminum-Alloy Seamless pipe and Seamless Extruded Tube; ASTM B313, Specification for Aluminum-Alloy Round Welded Tubes; and ASTM B 210, Specifications for Aluminum-Alloy Drawn Seamless Tubes.

Table 1 Minimum Wall Thickness for Aluminum Gated Pipe

| Tube Diameter (inch) | Minimum Wall Thickness (inch) |
|---|---|
| 6, 8 & 10 | .050 |
| 12 | .058 |

Plastic irrigation pipe shall meet the requirements of one of the PVC materials as specified in ASTM D1784 and shown in Table 2. The plastic compound shall contain an ultra-violet stabilizer that will protect against solar degradation for a minimum of 5 years. The pipe shall meet the requirements of ASTM D 2241, Polyvinyl Chloride (PVC) Plastic Pipe (SDR-PR), as shown in sections pertaining to dimensions and tolerances, flattening, extrusion, quality, conditioning, test conditions, and sampling. The minimum wall thickness for 6 through 12-inch diameter plastic gated pipe is 0.120 inches. The minimum working pressure for this pipe without gates shall be 22 psi or 50 feet of head.

Table 2 Material Specifications for Plastic Gated Pipe

| Code Classification | Designation |
|---|---|
| 12454-B | PVC 1120 |
| 12454-C | PVC 1220 |
| 13333-D | PVC 2116 |
| 13333-D | PVC 2112 |
| 13333-D | PVC 2110 |

## RELATED STRUCTURES

Delivery pipelines, ditches and structures supply water to the gated pipe shall have adequate capacity to deliver the required design flow. Gated pipe beginning at an open ditch shall begin with a permanent water control structure.

## CONSIDERATIONS

Consider applicability of surge or future automation alternatives in preparing design.

Consider need for thrust controls to prevent pipe movement at end plugs, bends, etc.

Consider water source and potential trash types and amounts when evaluating screen types and size.

Consider effects on the water budget, especially on volumes and rates of runoff to downstream water users.

Consider the effects on wetlands and water related wildlife.

Consider effects on water flows and aquifers and the affect to other water uses and users.

Consider the potential effect on irrigation water management.

## PLANS AND SPECIFICATIONS

Plans and specifications shall be prepared to show site specifics. The drawings and specifications shall show pipe location, pipe sizes and construction details for the inlet structure and screen as applicable, sizes and construction details for head control facilities, gate spacing and erosion details as appropriate.

## OPERATION AND MAINTENANCE

The operation and maintenance of the system shall include typical items of flushing pipe, cleaning and repairing screens and structures, replacing individual gates and gaskets, etc.

## REFERENCES

- Engineering Field Manual

  Chapter 3, Hydraulics

  Chapter 15, Irrigation

- NRCS Conservation Practices

  Structure for Water Control, Code 587

  Irrigation System, Surface and Subsurface, Code 443

  Irrigation Water Conveyance, Irrigation Pipeline, Code 430-AA to 430-JJ